SU585102

CLAIM

Method for wrapping up batched articles in stretch film, with articles arranged together on a substrate surface above a film sheet, covered with a plate, and wrapped up in the film together with the plate, with the film further heated, WHEREAS, to facilitate packaging and improve its quality, the batch is covered with an additional plate, with film egdes pressed together between the plates, one surface of each plate being coated with a hot-melt compound.

Союз Советских Социалистических Республик

Государственный комитет Совета Министров СССР по делам изобретений и открытий

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(54) СПОСОБ УПАКОВКИ ПАКЕТА ИЗДЕЛИЙ В ТЕРМОУСАДОЧНУЮ ПЛЕНКУ

1

Изобретение относится к упаковочной технике.

Известен способ упаковки пакета изделий в термоусадочную пленку, включающий заворачивание изделий в лист термоусадочной пленки, соединение свободных концов листа, охлаждение полученного шва и нагрев пленки [1].

Однако таким способом нельзя получить герметичные упаковки, кроме того, способ достаточно сложен, так как требуется сварка кромок листа.

Известен также способ упаковки пакета изделий в термоусадочную пленку, включающий группирование изделий на опорной поверхности поверх листа пленки, накрывание их пластиной, обертывание изделий и пластины пленкой и последующий нагрев пленки [2].

Однако наличие отверстий в пленке снижает качество получаемых упаковок, также сложен процесс упаковки.

Целью изобретения – является повышение качества упаковок и упрощение процесса упаковки.

2

Для этого пакет накрывают дополнительной пластиной и сжимают края пленки между пластинами.

На чертеже показана получаемая упаковка, общий вид.

На опорную поверхность, например конвейер 1, укладывают лист 2 термоусадочной пленки определенного размера, на котором размещают пакет 3 сгруппированных изделий. Сверху, упаковываемых изделий, укладывают жесткую пластину 4, например, из картона, имеющую термоплавкий слой полимера. Пластину 4 располагают термоплавким слоем вверх (от упаковываемых изделий). Затем пакет 3 изделий вместе с жесткой пластиной 4 обертывают листом 2 пленки, края которой загибают поверх пластины 4. Поверх образованного пакета 3 укладывают вторую пластину 5, обращенную термоплавким слоем вниз. Пластину 5 прижимают к пакету 3, который фиксируют в таком положении, а потом поворачивают на 180°. При этом края пленки оказываются зажатыми между пластинами 4 и 5 под воздействием веса упаковываемых изделий.

Пакет 3 нагревают в термоусадочном туннеле.

Упаковка, полученная таким способом, обладает высокими защитными свойствами и предотвращает попадание коррозионноактивных агентов внутрь нее, что способствует длительной сохранности изделий. Изготовление такой упаковки позволит отказаться от транспортной тары и консервации упаковываемых изделий.

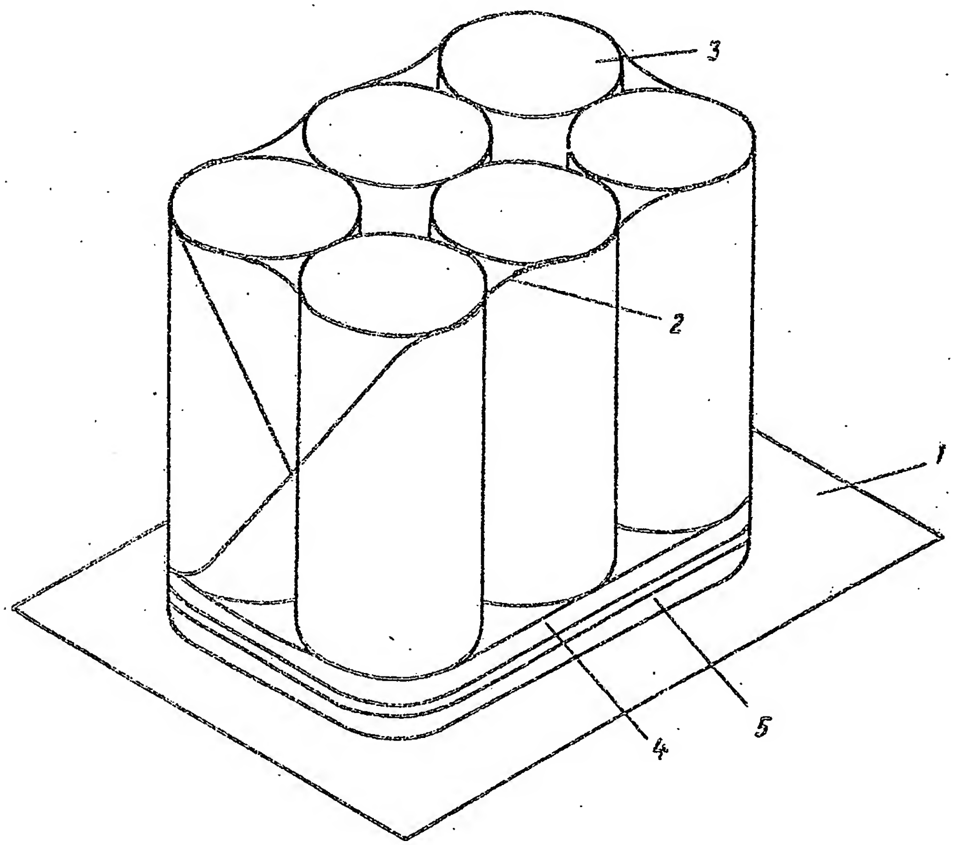
Формула изобретения

Способ упаковки пакета изделий в термоусадочную пленку, включающий группирование изделий на опорной поверхности поверх листа пленки, накрывание их пластиной, обертывание изделий и пластины пленкой и последующий нагрев пленки, отличающийся тем, что, с целью упрощения процесса упаковки и улучшения ее качества, пакет накрывают дополнительной пластиной и сжимают края пленки между пластинами, причем из поверхностей каждой пластины одна покрыта слоем термоплавкового материала.

Источники информации, принятые во внимание при экспертизе:

1. Патент Франции № 2079490, кл. В 65 В 11/00, 1971.

2. Патент США № 3522688, кл. 53-30, 1970.



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PACKAGE AND PACKAGING

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PACKAGING WAITS FOR INVESTMENTS

SHRINK FILM PACKAGING

Bunching envelope is a flexible transport bag bundle made of a light-gage (film) material (such as polymer film, fabric, paper, etc.). It's a sort of bundles, which fully covers the formed package to bind it and to protect its contents from harmful environmental effects (like moisture or dust). This packeting option has been widely used since shrink and stretchable polymer films became available.

Shrink films are polymer films capable of shrinking when exposed to temperatures higher than the polymer softening temperature.

Shrink films are produced by stretching a polymer material heated to highly elastic state followed by cooling. This creates oriented polymer molecular chains and results in the emergence of strain. On subsequent cooling and hardening, these deformations are fixed in the material due to both glass-transition strain and crystallization. Repeated heating of films involves relaxation, with the films tending to restore their initial size. This feature is called "polymer memory" or thermal shrinkage.

Shrink films can be made of many crystallizing thermoplasts, including low and high density polymers, polypropylene, mixed ethylene-polyvinyl chloride vinylacetate polymers, mixed vinylden chloride-vinyl chloride polymers (povyden), escaplen, etc. Their main features are shown in Table 1.

Table 1. Main features of shrink films

Polymer	Density, g/cc	Shrinkage degree, %	Shrinkage stress, mPa	Shrinkage temperature, °C	Welding temperature, °C
LDPE	0.92	15-50	0.3-3.5	120-150	150-200
Radiation-modified LDPE	0.92	70-80	1.0-3.5	110-120	170-230
Polypropylene	0.9	70-80	2.0-4.0	150-230	175-200
Polyvinyl chloride	1.4	50-70	1.0-2.0	110-155	135-175
Povyden	1.65	30-60	1.0-1.5	95-140	200-315
Polystyrene	1.05	40-60	0.7-4.0	130-160	120-150
Escaplen	1.1	30-50	1.0-2.5	100-150	180-250

LDPE shrink films are most popular due to their good mechanical strength within temperature range of -50°C - +50°C. These are readily weldable, elastic, inert to most of packaged goods, and affordable. Polypropylene shrink films are more rigid and strong as compared to PE films. They

are less susceptible to cracking when exposed to residual stresses, transparent, less permeable to vapor and various flavoring substances. In particular, povyden shrink film is elastic, highly transparent, physiologically harmless, vapor- and gas-proof, resistant to oil, grease, and many other aggressive chemicals.

Shrink films are also produced from radiation-modified polyethylene. The use of ionizing radiation in the production process provides for higher thermal stability, better shrinkage stress, and higher strength.

Shrinkage degree (shrinkage ratio) and shrinkage stress are most important characteristics of shrink films.

Shrinkage degree is a sample linear dimensions ratio before and after shrinkage. It is determined by the following formula:

$R_{sh} = (l_0 - l)/l_0 * 100\%$,

Where l_0 and l is the length of sample before and after shrinkage.

As mentioned above, extension (orientation) strains of polymer molecular chains are fixed during shrink films production. When the filmed is heated to highly elastic state, these strains are released and make the film shrink by bringing molecular chains back to their initial state. In case shrinkage is prevented by applied force, the film-developed shrinkage effort can be measured.

Shrinkage stress, as emerging when heating oriented material, is a shrinkage force – pre-shrinkage film sample cross-section ratio, which is measured in mPa. Shrinkage stress is dependant on film temperature and heating time. The lower is the heating temperature, the longer is the shrinkage, while shrinkage at high temperatures is quite fast. There are uniaxially- and biaxially-oriented films, all depending on lengthwise and crosswise shrinkage degree. Uniaxially-oriented films are basically shrinking unidirectionally, for example, by 50-70% lengthwise or by 10-20% crosswise. Biaxially-oriented films are shrinking bidirectionally, at the same or various shrinkage degrees, for example, by 50-60% lengthwise and by 35-45% crosswise.

Shrink films are made 20-250 μm thick with ±20% limit deviation, all depending on production technology and customer requirements. They are available in rolls as sleeves, half-sleeves or cloth. In production, these can be modified with various special-purpose additives, such as corrosion inhibitors (protect metal articles from corrosion), light stabilisers (extend service life, if used outdoors), selective oxidizers and antioxidants (for higher durability of films), dying pigments, and other compounds (for example those preventing film adhesion to polymer packaged goods during shrinkage).

Shrink film envelopes can contain single articles, grouped articles or package units, as well as transport bags or block packages, either palleted or not. To obtain large-sized cargo units from separate articles, packaged goods (boxes or bags) or parcels on a flat pallet or otherwise, a multi-level transport bag or block package shall be formed and fastened together by a tight bunching envelope made of shrink film.

Such cargo packaging technology involves the following:

- Forming a multi-level transport bag (tied up whenever possible) on a flat pallet or otherwise.
- Wrapping the bag so formed with shrink film.
- Welding the shrink film edges and making a bunching envelope or making a case and putting it onto the transport bag.
- Heating, shrinkage and cooling of bunching envelope.

In terms of design, shrink film bunching envelopes can be made either as top opening envelopes or as closed cases, which fully cover the package.

Top opening envelopes are made either of film substrate, as fed from two vertical rolls, with fragment edges spliced by two (on the front and rear sides of the bag) vertical joint welds (see Fig. 1a), or of a sleeve film fragment, which is fed from one roll and put onto the top of the bag (see Fig. 1b). Film substrate is much higher than bag *H*, with its protruding edges tightened onto the formed bag during shrinkage, while covering 50-70% of its surface from the top.

More particularly, a line that fastens the bags together by two vertical rolls-fed film substrate is normally mounted on the product manufacturing conveyor belt (for example, brick production) (see Fig. 2), and consists of parcel-making automatic machine *2* and shrinking device *3*. When the line is working, palleted bricks-formed transport bags *9* are displaced by conveyor belt *1* at a given pitch, reach the conveyor belt-blocking film substrate, as fed from two vertical rolls *4*, and are therefore covered by film on the front and side surfaces.

Afterwards, thermal welding bars *5* and *6* are closed behind the stopped bag, then film-wrap the bag from its rear surface, and weld the splicing film substrate by a double vertical joint weld, with the film cut off between the welds. Welding bars then get back to their initial position leaving the bag film-wrapped along the perimeter and separated from film substrate, which is ready for the next bag. Afterwards, conveyor belt delivers the bag to shrinking device *3*, which contains vertically displaced frame *7*, with radiation heaters *8* located on its inner perimeter. While the frame *7* with working radiation heaters *8* moves downwards, the envelope is heating and tightening over the transport bag. After the frame reaches its bottom position, it rapidly moves upwards to its initial state, with the above procedure simultaneously repeated at two points, fixed transport bags *10* delivered to the warehouse by conveyor belt.

Fig. 1. Cargo binding with shrink bunching envelopes: 1 – film substrate, 2 – sleeve film, 3 – flat pallet.

Fig. 2. Transport bag binding with shrink bunching envelopes